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Erysipelothrix rhusiopathiae Infection in Sheep

Two Outbreaks of Post-Dipping Lameness

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The object of this article is to give an account of two outbreaks of lameness which occurred during August on two farms in Kent following the summer dipping.

Farm No. I

This farm was situated on the Romney Marsh. The flock consisted of nearly 3,000 Romneys and Crossbred sheep purchased by a grazier for early fattening and quick sale. They were said to be in very good condition prior to dipping.

Dipping commenced on August 4th and was continued on August 5th and 6th. Approximately 1,000 sheep were dipped on each day in a proprietary DDT/Gammexane dip, used at slightly under the recommended strength. The dip was freshly made up before dipping on the first day and the bath was not cleaned out subsequently but simply topped up as required with dip concentrate and water. The dipping bath was an old brick circular washing tun holding about 900 gallons. It had not been used for four years and, prior to the dipping, was filled with rainwater and an accumulated sludge about a foot deep. The bath was stated to have been cleaned out (though not disinfected) and filled with fresh water before mixing the dip.

Lameness was first evident on Sunday, August 8th, in some 30 sheep and the following morning large numbers were affected. The shepherd stated that practically 100 per cent. of the sheep dipped on the third day were lame. Few or none of those dipped on the first day had become lame.

Symptoms

The first symptoms were observed two to five days after dipping. Affected sheep were dull, listless and off their feed. There was, invariably, a high fever which persisted for several days and was accompanied by an alarming loss of condition. Sheep were often observed lying down and when approached rose stiffly, and with difficulty. They moved stiffly, with marked lameness in one or more legs and were obviously in great pain. Where two hind legs were affected the sheep moved stiffly and straddle legged. All variations were seen from the sheep affected acutely in one limb to the sheep acutely lame in all four. Despite the severe lameness the sheep were not easy to catch and when forced to run the lameness practically disappeared, but reappeared when they were allowed to rest. Closer examination showed slight swelling of the fetlock joint in some cases and sometimes this swelling extended further up the limb but it was never very obvious. Palpation of the affected limbs showed marked heat and there was obvious pain on pressure in the region of the coronet. Where a single fore limb was affected the associated prescapular lymph gland could easily be palpated and was enlarged many times the size of the gland on the opposite side. There was no abscess formation or obvious lesion of the feet.

The loss of bodily condition shown by the lame sheep was very marked and was observed also in some sheep which were not obviously lame. After the acute phase of the disease had died down there was a steady improvement and after three weeks there were very few sheep lame. No mortality occurred but the farmer's loss in grazing time was very serious.

Bacteriological Studies

The appearance of the lesions, the definite incubation period, the high fever and enlargement of regional lymph glands, together with the history of increase in incidence of lameness in batches dipped on the second and third days, all pointed to the likelihood of bacterial infection being the cause of the trouble.

Examinations were made independently in the laboratories of both the writers with the following result:—

(*a*) *Wye.* Lame ewe killed. No macroscopic abnormality on autopsy. Cultures on blood agar and in meat broth were taken from subcutaneous tissue of affected limb, liver, kidney, spleen, heart blood, urine, synovial fluid. Cultures were incubated aerobically and anaerobically. A small Gram-positive pleomorphic bacillus (subsequently identified as *Erysipelothrix rhusiopathiae*) was isolated from the anaerobic meat broth culture taken from the subcutaneous tissue of the affected limb. All other cultures remained sterile, or yielded contaminants of no apparent significance.

(*b*) *Berkhamsted.* A teg, markedly lame in left fore limb, fair condition. Autopsy showed little beyond some oedema of the skin of the left fore pastern region and some excess fluid in the carpal joint on that side. The left prescapular lymph gland was greatly enlarged. Cultures were made on 10 per cent. sheep blood agar and in 0·1 per cent. glucose broth from heart blood, carpal joint, lymph gland and skin from left fore and left hind pasterns. Cultures of skin were made by searing a rectangular flap of skin, reflecting it back with sterile knife and forceps, and removing for culture a small piece of the deeper layer of the skin.

Cultures from heart blood and carpal joint remained sterile, those from lymph gland and skin (LH) were contaminated but the skin (LF) yielded a pure culture of a small Gram-positive bacillus. Studies of cultural characteristics, biochemical reactions, pathogenicity for mice and pigeons, and agglutination reactions identified this organism positively as *Erysipelothrix rhusiopathiae*. This strain of the organism was found capable of producing the typical condition of fever, acute lameness with heat and pain in the affected foot but no marked swelling when injected in pure culture under the skin of the pastern region of a healthy lamb.

At both laboratories tests of the dipping wash used were made. It was found that swabbing of the dip wash on a cut in the region of the fetlock of a healthy sheep produced, after two days incubation period, a transient febrile reaction with lameness in the affected limb. A control sheep whose forelegs without scarification or incision were immersed in the dip wash remained unaffected.

Furthermore, the inoculation of 0·1 ml. of a 1 : 100 dilution of the dip wash into each of two mice caused death of both in three to four days and *Erysipelothrix rhusiopathiae* was recovered in pure culture from their heart blood.

It was thus conclusively proved that the lameness was associated with *Erysipelothrix rhusiopathiae*, cultures of which produced the typical disease on inoculation into healthy sheep. The same organism was recovered by mouse inoculation from the used dip wash, which itself transmitted the typical disease when swabbed on to the incised skin of a healthy sheep.

Farm No. II

The outbreak on this farm occurred in the week following the former outbreak. This farm was situated on the high ground of the Weal:ds of Kent about 20 miles from Farm No. I.

The dip used was the same type of DDT/Gammexane dip that was used on the other farm. The wash was made up freshly in a deep washing tun similar to that seen on the other farm but in better condition.

On the first day (August 10th) 550 pedigree Kent sheep were dipped. No lameness appeared in them.

On the second day (August 11th) 320 Southdown ewes and lambs and 40 Kent ewe tegs were dipped. The lambs were then weaned and taken on to another pasture.

In this group lameness set in two to three days after dipping and grew progressively worse. At the time of our first visit (August 18th) we saw only the ewes and ewe tegs. About 50 per cent. of these were lame, the symptoms being similar to those seen at farm No. I. We were told that the incidence in the

lambs was lower and the shepherd did not seem concerned about them and we were not taken to see them. However, in the following days, many of the lambs became very ill and at the visit of one of us (G. F. K.) on August 23rd, five had died. Ultimately a total of 15 lambs died. Autopsy of one dead lamb showed peritonitis, enteritis and slight pneumonia. Cultures yielded *Erysipelothrix rhusiopathiae* from heart blood, subcutaneous tissue, spleen and lungs. No mortality occurred amongst the ewes.

DISCUSSION

The outbreaks described are similar to those encountered by one of us (H. E. H.) in New Zealand (see Whitten, Harbour & Allan, 1948). It was considered, as a result of the New Zealand work, that the infection of dipping washes possessing no bactericidal property occurred by contamination of the washes with soil carried in by the sheep. *Erysipelothrix rhusiopathiae* is commonly present on the farms in New Zealand where arthritis in lambs is a significant cause of freezing works rejections. It was further considered that infection of sheep took place through minor abrasions and cuts on the legs or body and it was observed that under New Zealand conditions of dipping the number of obvious abrasions was surprisingly high.

We have recently confirmed that it is possible to produce the typical disease (febrile reaction, heat, pain and lameness in the affected limb) by light scarification of the skin of the pastern followed by swabbing with as little as ·0002 ml. of a 24 hour culture in 1 per cent. glucose broth. It is, therefore, hardly surprising that the dipping of sheep in a dirty dip wash containing *Erysipelothrix rhusiopathiae* may be followed by a high incidence of lameness.

The mortality observed on Farm No. II was not encountered in New Zealand. It is thought that the fact that the lambs were weaned immediately after dipping may have been significant, the shock of weaning being sufficient to cause generalisation of a local infection.

In general, the typical picture of post-dipping lameness is one of an acute local inflammation (similar to the Erysipeloid of Rosenbach seen in man) resolving in two to three weeks, but knowing the types of disease produced by this organism it must occasion no surprise if, in some outbreaks, septicaemia or arthritis occurs.

The manufacturers of the dip in question have informed us that dips of this type have been in use in this country for three years and that many millions of sheep have been dipped in them, yet no previous report of disease of this kind had been received. This was in direct contrast to New Zealand where many cases occurred in the first season of use.

The explanation of this observation may be:—

(*a*) that *Erysipelothrix rhusiopathiae* may be more widespread in New Zealand,

(*b*) that prevailing atmospheric temperatures in New Zealand are higher,

(*c*) that larger numbers of sheep are dipped at a time and dip washes left standing for greater lengths of time than in this country.

With regard to point (*b*) it may be noted that both the outbreaks recorded in this paper occurred shortly after the pronounced heat wave at the end of July.

Optimum temperatures of growth for *Erysipelothrix rhusiopathiae* lie between 77° F. and 98° F. while the minimum temperature for growth is about 59° F.

It will be seen, therefore, that the opportunities for a substantial build-up of infection in dipping baths in this country must be fairly rare.

Whatever the cause may be, it seems certain that manufacturers of dips containing the new insecticides (which in themselves have no bactericidal action) must consider the introduction of some suitable bacteriostatic agent, either for addition to the bath or incorporated in the concentrate dip, if outbreaks of this kind are to be avoided.

Summary

1. Two outbreaks of lameness in flocks in Kent are described.

2. Lameness occurred two to five days after dipping in sheep dipped in a DDT/Gammexane dip wash left in the bath overnight after the first batch of sheep were dipped. No lameness occurred in sheep dipped in fresh clean dip wash.

3. Lameness was proved to be due to infection with *Erysipelothrix rhusiopathiae*.

4. The organism was shown to be present in the dip wash, having evidently been introduced by the sheep and grown in the presence of organic matter in the fouled wash.

5. While the general picture was one of local inflammation and lameness resolving in about three weeks, there was, in one outbreak, septicaemia and mortality in freshly weaned lambs.

6. The relationship of these outbreaks with similar outbreaks which have occurred in New Zealand is discussed.

Reference

Whitten, L. K., Harbour, H. E. & Allan, W. S. (1948.) *Aust. Vet. J.* **24,** 157-163.

Soil Fertility and Health *

By

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What are the factors which, in their entirety, decide the fertility of the soil? They may be summarised thus:—

1. Water. The rainfall in the S.W. of Scotland is usually adequate, but spring droughts have been known to occur.

2. Air. Roots require oxygen and this may not be present in adequate amounts if the land is over wet. Drainage is not yet perfect everywhere.

3. Temperature. This is for the present beyond our control, but tillage operations must be carried out timeously; and with the aid of the tractor this is more readily done now than when we were dependent on horses or cattle for power.

4. Root Room, *e.g.*, hard pan and a reasonable depth of soil. Hall refers to the poor thin soils of Ayrshire dairy districts in his book "A Pilgrimage of British Farming."

5. Absence of injurious factors, *e.g.*, *p*H or soil reaction, alkaline soils, saline soils, selenium, fluorides, and certain other minor elements, water logging, soil-borne diseases such as finger and toe.

6. Plant Nutrients. Here is where the chemist comes in! Thanks to chemistry the supply of nutrients is the factor most under the farmer's control.

7. The Major Elements.

(*a*) *Calcium.*

Soil reaction is controlled by adding lime (CaO), or ground limestone ($CaCO_3$) to the soil. This practice dates back to Roman days but is still all too often carried out inadequately. Calcium is a plant food, too, and even on Auchincruive it was found that unless lime were added, the Ca content of the grass was only one half of what it became after adding calcium in any form whatsoever. Now neither you nor I nor any farmer can tell whether the grass in a field is normal in this respect by looking at it, but the cow can tell by tasting it! During the Soil Survey of South Ayrshire about 17 years ago I discussed the effect of using nitro-chalk instead of sulphate of ammonia on pasture with Mr. Cross of Knockdon. He said he was not convinced but would try it out on a square field of nine acres by treating the centre acre with nitro-chalk and the remainder of the field with sulphate of ammonia. I got him to promise that he would watch the field carefully and let me know what difference he observed. Well, he watched the field. The grass grew and grew, but he could see no difference whatsoever. At last, concluding that the experiment was a failure, he put his whole milking herd—I think they had about 80 cows at that time—into the field. Then a strange thing happened. The cows all remained in the one acre plot in the centre which they ate as bare as a road, but never a bite did they take from the remaining eight acres. He kept them in, hoping that they would ultimately eat down at least some of the tall grass, but NO, they knew what they wanted, and in the end he had to cut the grass with a mower.

During the course of that same survey I came across a rather interesting connection between liming and the occurrence of milk fever. As time is short I will relate a typical case. A farmer had for a number of years experienced the loss of a number of cows every year from milk fever. Most, if not all, of his cows went down with this at each calving, and of these a proportion died. The farm had not been limed within the memory of anyone, but it is highly probable that this had been done during the 'eighties. Clover was scarce, very scarce indeed, and so he proceeded to apply lime to the whole farm. He then noticed that when the cows had been pastured on the limed fields the incidence of milk fever was greatly reduced, so he proceeded with a second round of the farm. Milk fever disappeared entirely, and at the time of my visit the farmer had not had a single case for a number of years. He was, however, considering the advisability of starting a third round. This is only one of a number of examples encountered during the course of that survey. I wished that the problem had suggested itself at the

* Extract of paper presented to the Ayrshire Division, N.V.M.A., on October 20th, 1948.

beginning of the survey instead of rather more than half way through!

One other point in connection with liming. In those days the making of cheese on the farm was beginning to be abandoned and one of the reasons given for this was that the cheese-maker could no longer get curd of the desired degree of firmness. It very soon transpired that the farms where this was experienced were those on which liming had been neglected. Another instance of calcium deficiency.

(*b*) *Phosphorus.*

This is applied to the soil as super-phosphate, as ground mineral phosphate or as basic slag. Phosphate deficiency is wide-spread in the South West of Scotland, with the exception of the early potato soils along the coast, where a big reserve has been built up by generous applications over a number of years. The problem of phosphate deficiency is complicated by the phenomenon of phosphate fixation. I am now going to give you my explanation though it may not always be a perfectly true picture. Ferric hydroxide is a positively charged colloid, and is consequently precipitated by the negatively charged phosphate ion. Chemical union may take place but no matter whether it does or does not, the resulting compound (or complex) does not liberate the phosphate ion appreciably, unless the medium be rendered alkaline, or so very acid that no plant can live therein. Note that I said in appreciable quantities. Nothing is quite insoluble. If there is a sufficiently large quantity of the so-called fixed phosphate present, there may be sufficient of the phosphate ion released in very small quantities at a time, to suffice for the normal slow growth of the plants. If this is so, then little or no response will be shown by the plant to the application of phosphate fertilisers. On the other hand, when growth is rapid during spring, especially if accompanied by the application of nitrogenous fertiliser, the plants may demand a bigger supply than is afforded by the fixed phosphate, and a response to the phosphate dressing can then be seen.

The awkward part of all this is that the chemist may report a soil as being deficient in phosphate and yet the farmer fails to get any response; worse still, when the soil is again analysed at a later date, no improvement in the phosphate status is reported even though enormous dressings of phosphatic fertiliser have been applied. Very awkward for the soil analyst. However, we are now beginning to see a possible way out of the dilemma. We may use another extracting reagent which will attack the fixed phosphate to a certain extent, and if this second extractant gives a reasonably high value we can say that the amount of fixed phosphate present is probably sufficient for ordinary needs. This will, of course, double the amount of work we have to do, and we will have to do a certain amount of exploratory work before we can definitely adopt the routine.

I believe that you have discovered a new disease called "a-phosphorosis," which, I surmise, is just a fancy name for phosphate deficiency, but may really be due to excessive fixation of the small quantity of phosphate actually present. It is, therefore, often due to a deficiency of available rather than of total phosphate. Fixation may be reduced by increasing the organic matter content, *e.g.*, heavy dressings of farmyard manure, or keeping the land in grass and then liming. The iron or aluminium hydroxide is then coated with humus as a protective colloid and this in turn is coagulated by the calcium. If, after all this, we add phosphate, the phosphate will be on the outside, linked with the calcium and NOT with the sesquioxide and thus will be largely available.

This practice has been found successful in America, and will, I hope, be tried here.

(*c*) *Potassium.*

The third major element I must mention is potassium, and this but briefly. The most striking thing about the behaviour of this element in the soil is that it accumulates in grassland, particularly acid pastures. Rushes and bracken mobilise potassium in the surface layers of the soil, withdrawing it from the sub-soil. On the other hand, the potassium content of the soil appears to fall rapidly during the hay crop. The clovers, of course, are apt to indulge in luxury consumption of this element, and as they are removed in the hay crop, the potassium is carried away too. This will also happen if root crops are not consumed in the field.

(*d*) *Magnesium.*

Magnesium is an essential element, but I do not think that we are likely to encounter many cases of magnesium deficiency in farm crops in Ayrshire, as magnesium was found to be present in the exchangeable bases of Ayrshire soils in even larger quantities than calcium. The explanation is probably to be found in the occurrence of extensive intrusive volcanic rocks in the county.

8. The Minor Elements. Deficiency or excesses of "trace" or "minor" elements may become of major importance in some cases, and you are all familiar with cobalt in this connection. My colleague, Mr. Voss, a spectrographic chemist, will be responsible for analyses for trace metals such as cobalt. Now to return to the factors which affect the health of animals. These can be summarised under two heads: *viz.*, housing and diet.

The first is fairly rigidly controlled by various Acts of Parliament, and the second, at least in part, by the farmer who is himself to some extent controlled by the soil. If, therefore, illness is thought to be due to diet it may be due to the soil itself. What can you do about it?

I think the answer is fairly simple. Arrange to meet the county organiser on the farm and have a conference. The farmer will tell you how he has treated his animals and his fields, *i.e.*, rations and fertiliser treatments. The county organiser will then take what soil samples he considers necessary and then we, the soil chemists, will do the analysis and give you the limiting factors to the best of our ability. In this way we all avoid unnecessary work and get our results with the minimum of effort. As an example, I see no point whatsoever in making an analysis for cobalt on an acid soil deficient in phosphorus. If there is a shortage of one or more of the major elements such as phosphorus or calcium, the soil will be out of balance anyhow, and cobalt deficiency if present becomes of secondary importance.

Just as a biochemist would prefer to hear from the veterinary surgeon how the animals thrive on a given diet rather than evaluate that diet by analysis, in the same way I prefer to ascertain a soil's deficiency in nitrogen by applying a nitrogenous dressing to a small area and noting the response given by the grass.

Given close co-operation between the farmer, the county organiser (for the soil comes before the plant, and the plant before the animal) and the animal health officer, together with such assistance as may be called for from the soil chemistry staff and the plant pathologists, Scotland, and the South West of Scotland in particular, should be able to produce more than the prescribed three-fifths of her food, which is, I believe, the determined minimum if we are to survive.

Trace Elements and Animal Health *

By

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In the few minutes available I do not intend to bore you with technical details of spectrographic analysis These methods are based on the phenomenon that at high temperatures each element emits light of characteristic wavelength. From the wavelength and intensity of the light from any sample we are able to identify and determine quantitatively the elements present. Many methods have been developed for the determination of minute traces of elements in various materials so that spectrographic analysis in the West of Scotland will not be restricted exclusively to soils but will include biological materials, both plant and animal, as well. This method is mainly of value in determining very small traces of elements which might escape ordinary chemical analysis unless extremely detailed. It is therefore of particular value to veterinary surgeons in investigating the elements associated with animal health in one way or another. By far the most important of these in Scotland is cobalt. Except for cases of definite poisoning, it is the only trace element which can be said to have anything approaching a known normal and sub-normal level in either soils or plants. It is of great importance in pasture, and pasture soils where plant health does not appear to be affected but where deficiency leads to the disease "pining" in stock. There is a fairly wide range between normal and sub-normal owing to the effects of numerous other factors which are important in this zone. Soil reaction is important, and liming depresses the availability of cobalt.

There is a differential uptake of cobalt by different plant species and at different stages of growth of the same plant which is of importance when sampling pasture. To ascertain the availability of cobalt it is, however, generally sufficient to determine the acetic acid extractable cobalt in the soil. This is taken as available cobalt. In some soils where there may be no absolute shortage of cobalt there may be a lime-induced deficiency (as in the shell sand soils of Tiree) and in such cases only the cobalt content of the plants themselves will give analytical indication of a deficiency. We still do not know the part cobalt plays in the animal's meta-

* Paper presented to the Ayrshire Division, N.V.M.A., on October 20th, 1948.

bolism, although it is interesting and probably significant that all the animals prone to suffer from cobalt deficiency are ruminants, so that the rumen flora and bacterial synthesis may be concerned. Indeed, Tosic & Mitchell (1948) have recently shown that the bacterial fraction isolated from the rumen has a much higher concentration of cobalt than the rest of the rumen contents. Another interesting point about cobalt, as E. L. Smith (1948) has recently found, is that the pure crystalline anti-pernicious anaemia factor is an organic compound containing 4 per cent. of cobalt.

Another trace element is copper. This has been associated with "swayback" in sheep although the relationship is not clearly established or understood. Where it occurs, the concentration of copper in the herbage is often very low, but swayback is also found where copper figures are normal. In the latter case it is usually associated with high lead, tin or zinc concentrations. What bearing, if any, this has on the associated disseminated sclerosis we cannot say.

Molybdenum is another element necessary in minute quantities for plant growth. When this is present above a certain critical level it gives rise to a condition in cattle called "teart." This position is complicated by the fact that oral administration of copper cures this disease. Here again there is a variable uptake by plants, clover taking up more than grasses. In contrast to cobalt, liming increases the availability of molybdenum to plants. Very similar conditions occur in the case of selenium, the cause of "alkali" disease in the U.S.A.

Complications arise when more than one trace element is involved simultaneously. For example, cases have been found in Scotland where cobalt deficiency and molybdenum excess occurred together and, moreover, there were indications that cobalt dressing of the soil increased the availability of molybdenum.

Other important trace elements are:—

Manganese: deficiency is associated with perosis in fowls but it is possibly of greater importance to plants than animals
Fluorine and Iodine: necessary for adequate animal nutrition.
Zinc and Boron: important in plant nutrition.

Other elements such as arsenic, lead or nickel when present in the soil in abnormally high levels (relatively speaking) are toxic to plants and animals. They may occur naturally, but often arise by contamination with either dust or effluents from factories or mineral ore deposits. Where such contamination is suspected it is invariably best, where feasible, to analyse the herbage or food involved as well as the organs of affected animals. When sampling soil for such purposes, it will be borne in mind that even a heavy surface contamination would not be revealed—owing to dilution—if a soil sample were taken to several inches depth.

In this connection I must emphasise that wherever trace element determinations are likely to be required, great care must be taken to avoid contamination during sampling or subsequent handling. The usual sources are soil contaminating plant material, and sample bottles with metal caps. With these precautions the spectrograph is a useful adjunct to veterinary diagnosis but it is not a universal "cure-all." It has its uses in the detection of trace elements but the interpretation of the quantitative results is still a big problem. It has to be considered whether the figures for one particular trace element (for example, soil manganese in the case of plants) have any significance or bearing on the problem. It must be remembered that the importance of most trace elements is still not certain, and that the whole subject is still under investigation and, as it were, *sub judice*. I should like to emphasise that I am convinced that the only satisfactory results will be those obtained by collaborative investigations in which the veterinary surgeon in the field, the advisory officer, and the research worker are all partners. In this connection I wish to emphasise that though the purely animal aspect of the subject is outside the province of a chemist it is essential for the full interpretation of the results of spectrographic analysis that I, or other advisory officers in the same position, be in possession of the full facts of the case. There are two very good reasons for this. Firstly, the type of problem determines the method of analysis; and secondly, the whole subject is so much in its infancy that there is great necessity for full information to correlate the analytical findings with the case histories so as to build a firm foundation for the future.

Finally, from the advisory point of view it is said that "soil analysis is a last resort usually undertaken to confirm a common-sense decision." This is equally applicable to spectrographic analysis which is an adjunct to other methods of investigation, and not a short cut to the answers.

References

Smith, E. L. (1948.) *Nature*. **162.** 144.
Tosic, J., & Mitchell, R. L. (1948.) *Ibid*. **162.** 502.

CLINICAL COMMUNICATION

Tetanus in the Cat

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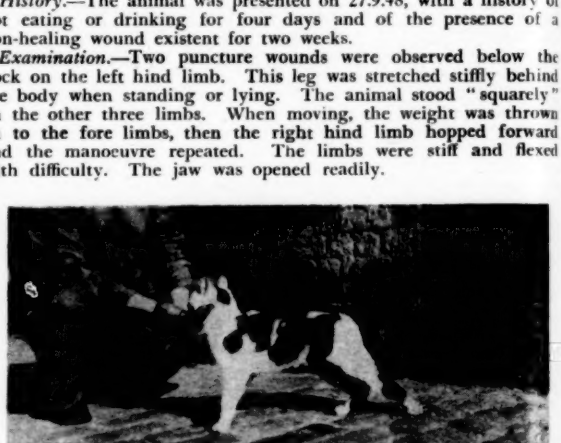
Subject.—Adult neuter cat.

History.—The animal was presented on 27.9.48, with a history of not eating or drinking for four days and of the presence of a non-healing wound existent for two weeks.

Examination.—Two puncture wounds were observed below the hock on the left hind limb. This leg was stretched stiffly behind the body when standing or lying. The animal stood "squarely" on the other three limbs. When moving, the weight was thrown on to the fore limbs, then the right hind limb hopped forward and the manoeuvre repeated. The limbs were stiff and flexed with difficulty. The jaw was opened readily.



Photograph taken on day of admission for treatment

Diagnosis.—Tetanus.
Prognosis.—Grave.

Summary of Treatment Adopted

Tetanus antitoxin: 4,000 units intravenously followed by 2,000 units subcutaneously daily for five days. Immediately on completion of the initial injection the subject vomited and was greatly distressed. Anaphylactic shock was assumed and 5 m. adrenalin hydrochloride given intramuscularly.

Penicillin: 200,000 units intravenously followed by 100,000 subcutaneously for four days.

Magnesium Lactate (20 per cent. soln.) 3 c.c. subcutaneously followed by 5 c.c. twice daily for four days. Pain was marked, coincident with each injection.

Glucose-saline: 3 oz. twice daily subcutaneously from 31.9.48 to 2.10.48, followed by 10 oz. daily for four days.

Plexan Liver Extract: 2 c.c. intramuscularly from 31.9.48 to 2.10.48.

The wounds were dressed daily with penicillin-in-oil (20,000 unit intramammary tubes). Whilst totally recumbent the subject was turned from side to side several times daily. The bladder was emptied manually twice daily from 31.9.48 to 6.10.48.

Summary of Progress of Disease

28.9.48. Can stand but moves very stiffly, neck stiffer, ears pricked, jaws stiffer; anxious expression; increased rigidity of the body.

29.9.48. Definite improvement in movement on three legs; jaw easier. Not eating or drinking—unable to prehend solid or fluid.

30.9.48. Rigidity more marked; eyes slit-like. The whole body rigid, the limbs can be slightly flexed by the application of considerable manual force. Consciousness was apparently maintained throughout, the subject crying when approached. Nasal catarrh and conjunctivitis were apparent and persisted for several days.

1.10.48. Rigidity less pronounced. A little fish and milk placed in the mouth, swallowed with difficulty after prolonged mastication.

2.10.48. When placed upon his feet, able to hop about.

3.10.48. Able to flex fore limbs voluntarily and move more easily. Still unable to prehend food. Body less stiff, head more mobile.

5.10.48. Lapping a little and able to prehend small pieces of

fish or meat—mastication very prolonged. Defaecated. Able to exercise a little.

7.10.48. Beginning to clean itself. Left hind limb still rigidly held behind body, but able to walk well on three legs.

Subsequently improvement was steady until on 20.10.48, the left hind limb could be flexed voluntarily and the animal walked on four legs.

NOTES

(*a*) The rarity of the condition in the feline, an animal frequently subject to deep wounds (bites, traps, etc.). The well-known cleanliness of the species may have some bearing on this point.

(*b*) No displacement of the membrana nictitans. Deglutition possible but unable to prehend food. Cessation of defaecation and micturition.

(*c*) The pain occasioned by magnesium lactate subcutaneously. The reaction to tetanus antitoxin intravenously.

(*d*) Incubation period approximately ten days. Duration of disease approximately four weeks.

ABSTRACTS

[Studies on the Histopathology of Acute Laminitis. NILS OBEL. (1948.) Uppsala. Almgrist and Wiksells Boktryxkeri A.B.]

In this monograph the author gives the results of histological examinations of specimens from spontaneous cases of post-parturient laminitis, alimentary laminitis and from cases of experimental alimentary laminitis in the horse. An interesting feature of his work was that his studies were not limited to the hoof structures. He also investigated the changes which occurred in the chestnut, as in this situation he was able to exclude pathological processes which were of a secondary nature and due to changes in the position of the os pedis caused by the weight of the body.

Details of his histological findings together with a series of excellent photomicrographs are to be found in this publication.

Summarising his findings, the author states that his histopathological studies have not disclosed the true nature of the disease but he believes that they do indicate that future research should be directed to determining the biochemical basis for the disturbances in the process of cornification which were revealed in the course of his examinations.

Regarding the pathogenesis of laminitis he states, "The disease is a disturbance in the process of cornification in the hoof and is characterised histologically by the disappearance of the onychogenic substance from the zone of cornification. Due to the consequent decrease in the strength of the epithelium the body weight causes an overstretching of the secondary epidermal laminae and a sinking of the os pedis. In serious cases the stretching of the laminae leads to partial necrosis and this may become so extensive that it results in a complete dissociation between the horny laminae with the adjacent parts of the secondary epidermal laminae and the corium with the surviving epithelial cells in the basal edge of the secondary laminae."

G. D.

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[Sudden Death in Calves associated with Myocardial Degeneration. SCHOFIELD. (1947.) *Canad. J. comp. Med.* Nov. pp.324-329.]

A highly fatal disease of calves is described, characterised by very sudden death and, usually, a lack of observable symptoms. Cases were seen in calves of three to 14 weeks of age and usually occurred singly. There were indications of a hyper-acute form of the disease. Myocardial degeneration of a hyaline nature accompanied by necrosis characterised most of the cases. The pathological and histopathological findings are described.

Although the condition in some respects closely resembled "white muscle disease" of calves, the author did not believe the cause to be a deficiency of vitamin E, or that the condition was intimately related to muscular dystrophy. The aetiology of the disease remained unknown, though in the author's opinion the *post-mortem* findings pointed to the formation in the gastro-intestinal tract of a toxin which damaged the myocardium and other organs.

C. A. E. B.

[Investigations on the Typing of Staphylococci by means of Bacteriophage. I.—The Origin and Nature of Lysogenic Strains. II.—The Significance of Lysogenic Strains in Staphylococcal Type Designation. SMITH, H. W. (1948.) *J. Hyg. Camb.* **46.** 74-81 (6 refs.); 82-89 (7 refs.).]

I. The author, finding that most cattle strains of staphylococci are susceptible to phage 42D, sought for further proof that these cattle strains were really identical. He found that strains lysogenic to strains susceptible to phage 42D were themselves resistant in varying degree to this phage. As the dilution of a phage filtrate used in tests is that which produces confluent lysis of the propagating strain, it is obvious that the capacity for being typed as lysogenic strains depends on whether or not they are more resistant than the propagating strain. Resistant variants of a non-lysogenic strain were usually found to be carrying the phage. Acquired phage resistance seemed to be responsible for the differentiation of sub-types, non-lysogenic strains being susceptible to all phages within the groups, lysogenic strains to only some of them. Two strains each made resistant to the same two phages were found to carry one of them only. In another instance, two strains made resistant to two other phages were each found to be carrying both phages.

II. The author extended his findings for strains susceptible to 42D to type phages of Wilson and Atkinson. He again found that sub-types within each group were largely explained as a result of strains acquiring resistance to phages. A scheme for phage-typing independent of acquired resistance was suggested. He found that resistant strains were stable under laboratory conditions but that changes of phage type were rapidly produced by growing together strains of which one or both were lysogenic to the other. In one case a resistant strain, produced by growing a mixture of two strains, was also found in cow's milk together with the same two strains. The author considers that changes of phage type arising from mixed cultures in nature may be of some epidemiological importance, especially in long-term studies.

A. W. G.

REVIEWS

[Kursus der veterinarmedizinischen Mikrobiologie. *By* Dr. K. WAGENER. Publisher: Richard Schoetz, Berlin. No price given.]

This is essentially a text-book for the student or junior laboratory technician. The mechanics of the common laboratory techniques are described and well illustrated, often in colour, step by step. Much useful information is presented, including the formulae of stains and laboratory solutions, and coloured diagrams of the developmental stages of the various cells of the blood, the complement fixation test, the agglutination test, etc. Unfortunately, the fact that the script is in German will considerably reduce its appeal in this country.

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[The Pharmaceutical Pocket Book. REVISED 15TH EDITION. (1948.) The Pharmaceutical Press, 17, Bloomsbury Square, London, W.C.1. Price 12s. 6d. Postage 4d.]

This book contains an immense amount of information valuable to the veterinary practitioner, presented in a very readily available form. It is primarily intended for pharmacists and has inevitably a largely medical bias, but the sections on the Science and Art of Pharmacy, Equivalent Measures, Forensic Pharmacy and Veterinary Posological Table have particular interest for veterinary surgeons.

There are various other less important headings which are nevertheless of interest; for instance, a chapter on the removal of stains and on hydrogen ion concentration.

This pocket book can well be recommended to both students and practitioners.

WEEKLY WISDOM

While Lord Leverhulme and the Ford company have built vast new estates on former marshes, Government departments cannot build at all unless the land is already beautifully drained and as level as a bowling green.—Mr. H. WOOLLEY, vice-president of the N.F.U., quoted by *The Times* in a protest against the requisitioning of agricultural land.

Meeting of Council, N.V.M.A.

Summary of Proceedings

There was a good attendance of members of Council at the New Year meeting, held at the Connaught Rooms, W.C.2, on Friday, January 7th, 1949, with the President, Dr. R. F. Montgomerie, in the chair. The expeditious fashion in which the large volume of business was dealt was a tribute to the work of the various committees, whose reports formed the bulk of the agenda.

Seasonable greetings from the Chair preceded a warm welcome to Mr. H. T. Matthews on his recovery from operation. Council then learned of a check in the upward trend of membership, due to the number of members whose names were due for removal from the Association's Register under Article 35. It was hoped that some would respond to the special dispensation that their subscriptions be accepted, to continue membership, up to the time of the publication of the Council minutes.

Expenses of Divisional Representatives on Council and Committees.—Council accepted recommendations from the General Purposes and Finance Committee in regard to the payment of the expenses of representatives of Branches and Divisions serving on Council and Committees of the Association. It is hoped that these will very materially reduce the burden of present-day travelling and subsistence costs in attending meetings of Council and/or Committees. These changes are operative as from January 1st, 1949.

N.V.M.A. Conference on Grassland and Animal Health.—The proceedings of this conference will be published shortly in the form of a handbook. The Council placed on record its special gratitude to all concerned with the outstanding success of the conference and the General Purposes and Finance Committee is to consult with the Technical Development Committee—to which the various matters brought out are being referred for future action—in the arranging of such future conferences.

XIVth International Veterinary Congress.—The N.V.M.A. so far as is within its power, is to augment the occupational and professional aspects of the programme of the International Veterinary Congress to be held in London from August 8th to 13th, 1949. The officers are to form themselves into a Provisional Committee for the Association's own Congress, providing a programme of professional and social events to be fitted in, if possible, with the arrangements for the International Congress.

Animal Disease Control.—Discussions with the National Farmers' Union on the formulation of a new Scheme for the Control of Certain Diseases of Dairy Cattle are continuing at committee level concurrently with discussions with the Ministry of Agriculture.

The Ministry has agreed to an early meeting with representatives of the Association to discuss further plans for the eradication of bovine tuberculosis on an area basis. A further confidential memorandum on the subject has been received. The Technical Development Committee has under urgent consideration the important position which Salmonella infections in cattle appear to occupy in Great Britain.

The printing of forms dealing with the collection of accurate data on the incidence of disease has not yet been completed, but action is not being delayed. The suggestion that the work might be facilitated by the co-operation of V.I.O.s with the veterinary surgeons practising in their area is being taken up with the Ministry.

Horse Breeding Act Anomaly.—The officers were disturbed to find that new administrative arrangements had been made whereby a specially selected livestock officer examines and reports on conformation in addition to the veterinary surgeon, despite the fact that appointments are made from veterinarians with a known interest in and long experience of the horse. They had taken the point up with Animal Health and the Livestock Divisions of the Ministry, the latter being primarily concerned. So far no satisfaction has been obtained, and further pressure is to be exerted.

Overseas Services.—The report of this Committee showed that its role as the "watch-dog" of the interests of veterinary personnel in the British Dominions, Colonies and Dependencies is widely appreciated abroad. Where terms and conditions of service call for improvement vigorous action is taken by the Association whenever this usefully can be done.

Small Animal Practice.—Discussions with the R.S.P.C.A. with a view to removing some of the difficulties which have arisen in the working of the agreement with that Society concerning clinics were reported to have made progress.

A sub-committee has been appointed to review the trend of small animal practice and to suggest lines on which it might develop to meet the changing conditions of these days.

The meeting closed with a vote in keen appreciation of the work of members acting as Petrol Liaison Officers; also to the officers of the Association.

NOTES AND NEWS

Diary of Events

Jan. 22nd.—Meeting of the Biochemical Society, at the British Postgraduate Medical School, Ducane Road, Hammersmith, W.12, 11 a.m.

Jan. 25th.—Meeting of the Derbyshire Division, N.V.M.A., at Sutton Bonington (Midland Agricultural College), 2.15 p.m.

Jan. 27th.—Meeting of the West of Scotland Division, N.V.M.A., Clinical Club, at the Glasgow Veterinary College, 7.30 p.m.

Jan. 27th.—Meeting of the Western Counties Division, N.V.M.A., at Exeter (Royal Clarence Hotel).

Jan. 28th.—Annual Meeting of the Yorkshire Division, N.V.M.A., at Leeds (Hotel Metropole), 2.30 p.m.

Feb. 8th.—Scientific Meeting of the Zoological Society of London, Regent's Park, N.W.8, 5 p.m.

Feb. 8th.—Royal (Dick) Veterinary College Annual Ball.

Feb. 18th.—Meeting of the Sussex Division, N.V.M.A., at Brighton (Old Ship Hotel), 2.30 p.m.

Aug. 8th to 13th.—Fourteenth International Veterinary Congress, Central Hall, Westminster, and Church House, Westminster, London, S.W.1.

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Fees for Lectures given by Members of the Veterinary Profession at Agricultural Colleges and Farm Institutes

The N.V.M.A. is reviewing the present position regarding the terms and conditions of appointments as part-time lecturers at agricultural colleges and farm institutes. Members holding appointments of this nature are invited to send full details to the General Secretary, N.V.M.A., 36, Gordon Square, W.C.1.

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N.V.M.A. Membership Subscription

The attention of members is drawn to the following Article of Association of the N.V.M.A.:—

> 35. During the first week of March in each year, notice shall be sent to all members whose subscriptions shall be unpaid. Should the subscription of any member remain unpaid by the 30th day of June, he shall cease to be entitled to receive the publications of the Association or to attend or vote at any General Meeting but shall remain legally liable for his subscription. If the subscription of a member shall be in arrear for one year he shall cease to be a member of the Association.

In the past, through failure to pay their subscriptions when due, the Association has been in the unfortunate position of having to remove the names of a number of members when it had been only a matter of inadvertence that the subscription had not been paid. The Officers of the Association will be pleased if this position can be avoided in future by members recognising the need to have their subscriptions paid in good time.

The majority of members find a banker's order the most convenient method of payment, and the General Secretary will be glad to send one of these forms to any member desirous of adopting this system.

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PERSONAL

Birth.—Farrell.—At Ashbank, 1, Race Road, Bathgate, on Sunday, January 9th, 1949, to Fay, wife of Adam V. Farrell, M.R.C.V.S., a daughter. Both well.

Newlands.—On January 10th, 1949, to Peggy, wife of Hugh Newlands, M.R.C.V.S., Veterinary Dept., Dar-es-Salaam, Tanganyika —a daughter.

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R.C.V.S. OBITUARY

Roemmele, Hermann Michael, Capt. late R.A.V.C., 86, Dowanhill Street, Glasgow. Graduated Edinburgh, July 14th, 1917. Died January 10th, 1949; aged 64 years.

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AMERICAN COLLEGE FOR THE POST-GRADUATE STUDY OF VETERINARY PATHOLOGY

In our issue of October 21st, 1944, attention was drawn to the establishment in the U.S.A. of a Registry of Veterinary Pathology. It is hoped that a later publication will deal with the work of this registry and how the existence of such an institution in England might be of tremendous benefit to veterinary pathology, teaching and research, as a whole. Recently another very important step has been taken in the U.S.A. which is progressive and needed and which shows the trend of bringing veterinary education more into line with modern medical practices. In the U.S.A. there is probably a greater divergence of standards in both general veterinary and medical education, subsequent to graduation. In medicine, however, before a worker can be labelled as a specialist in many specific branches of medicine he is required to pass a special board examination. There are many specialised boards now in existence and the standards set in some subjects are extremely high, *e.g.*, internal medicine, pathology, psychiatry, surgery, gynaecology and obstetrics, radiology, etc. A parallel step has recently been taken in connection with veterinary education which should be of interest to veterinarians in England.

There is, because of the size of the U.S.A., a very large number of veterinarians engaged in full-time scientific research and the general interests in pathology would seem to be wider than is apparent in England. It is interesting, however, to note that at a recent meeting in Chicago attended by veterinary pathologists from many places throughout the States, an "American College of Veterinary Pathology" was established.

This organisation is to be composed of members of the veterinary profession who have particular training and competence in veterinary pathology. The objectives of this organisation are to establish standards of training and experience for specialists in veterinary pathology; such specialists as are considered qualified following evaluation of their experience and training, and the satisfactory completion of a qualifying examination, will be certified as specialists to the interested public. The organisation expects to promote scientific progress in veterinary pathology and to encourage young men to enter the specialty after graduation from veterinary college. All of the members of this organisation are members of the American Veterinary Medical Association and it is expected that the organisation will develop within the framework of the A.V.M.A.

At this organisational meeting a committee was appointed to make an initial study of training and experience which should be required before a candidate is permitted to take the board examination. A committee was also appointed to study teaching and training methods in veterinary pathology. Although it was recognised that within the veterinary profession there is wide variance in special training required for different positions, it is felt that to be a veterinary pathologist an individual must be thoroughly informed and competent in gross and microscopic pathologic anatomy. A committee on constitution and by-laws was also appointed and temporary officers were elected to serve until the constitution and by-laws are finally adopted. The officers so elected were: William H. Feldman, President; Alfred G. Karlson, Vice-President, and T. C. Jones, Secretary-Treasurer.

DOCTORS EMPLOYED BY LOCAL AUTHORITIES

B.M.A. Advertisement Ban Proposal

In its issue of January 13th, *The Times* reports that, after discussing at a meeting in London the previous day the need for better pay and conditions for doctors employed by local authorities, the council of the British Medical Association passed a resolution to the effect that if negotiations to improve them had not begun by February 28th, the *British Medical Journal* would refuse to accept advertisements for staff wanted by local authorities unless the salaries advertised conformed to the earnings demanded by the B.M.A. A letter together with the resolution was to be sent to the Minister of Health, on behalf of 43,000 doctors.

Most of the meeting was devoted to questions of pay and conditions. There was a discussion on car mileage compensation for rural doctors, many of whom, it was claimed, had had to forfeit many patients. [An announcement of higher mileage payments has since been made by the Ministry.]

Women members, in a protracted debate on women doctors in the services, urged that they should be placed on the same basis as men.

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INTERNATIONAL TSETSE RESEARCH

Britain will lay the new anti-trypanosomiasis product, antrycide, before the International Scientific Committee for Trypanosomiasis Research which will meet at the Colonial Office from February 8th to February 11th. France, Belgium, Portugal, South Africa, and Southern Rhodesia are each sending two representatives with advisors and observers, to this committee, which is a permanent body set up as a sequel to the International Conference held at Brazzaville in February, 1948.

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CENTRAL LIBRARY FOR ANIMAL DISEASES

Owing to war damage repairs prospective readers are requested to give at least three days' notice and specify the books they require so that these may be brought down to the temporary Reading Room. Current periodicals will be available as usual.

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Accessions for Quarter Ending December 31st, 1948

Presentations

Books

Cowie, A. T.: Pregnancy diagnosis tests: a review. (1948). Presented by the author.

Dietrich, A.: Grundriss der allegemeinen pathologie. (1927). Presented by Dr. Hare.

Festschrift, 50 Jahre tierärztliche Hochschule in Wien. (1948). The humanities and sciences in Denmark during the second world war. (1948). Presented by the Royal Veterinary and Agricultural College, Copenhagen.

The Humanities and Sciences in Denmark During the Second World War. (1948). Presented by the Royal Veterinary and Agricultural College, Copenhagen.

Moustgaard, J.: Om Proteinstoffernes Indflydelse paa Nyrefunktionen. (1948). Presented by the Royal Veterinary and Agricultural College, Copenhagen.

Pepperall, R. A.: The Milk Marketing Board. (1948). Presented by the Publishers.

United States. Department of Agriculture. The Bureau of Animal Industry of the United States: Its establishment, achievements and current activities. (1924). Presented by the American Library U.S. Embassy.

United States. Department of Agriculture. Special Report on the diseases of the horse. (1903). Presented by the American Library. U.S. Embassy.

Reports, 22; *Pamphlets and Reprints*, 263.

Purchases

Asdell, S. A.: Patterns of Mammalian reproduction. Ithaca. (1946). 27s. 6d.

Goldberg, M.: English-Spanish Chemical and Medical Dictionary. New York and London. (1947). 60s.

Graub, E.: Reinfection tuberculosis in cattle and the effect on the resistance. Basel. (1947). 15s.

Index-Catalogue of the Library of the Surgeon General's Office. U.S. Army 1st. Series Vol. 1, Washington 1880. 30s.

Kobozieff, N. *and* Pomraiskinsky-Kobozieff, N. A.: Précis de génétique appliquée a la médecine vétérinaire. Paris. (1943). 4s. 7d.

KOUTZ, F. R., *and* REBRASSIER, R. E.: Identification and life cycles of parasites affecting domestic animals. Ohio. (1948).

LAFENETRE, H. *and* DEDIEU, P.: Technique systématique de l'inspection des viandes de boucherie. 2nd ed. Paris. (1946). 13s. 6d.

MATHIS, C.: L'Oeuvre des Pastoriens en Afrique Noire. Afrique Occidentale Francaise. Paris. (1946). 8s. 11d.

RICHARDSON, U. F.: Veterinary protozoology. London. 18s.

THOMPSON, D. A. W.: On growth and form. 2nd ed. Cambridge. (1942). 50s.

UNITED STATES. Department of Agriculture. Yearbook of Agriculture for 1943-47. Washington. (1947).

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Scheme for the Control of Diseases of Dairy Cattle

STATEMENT SHOWING THE NUMBER OF UNDERTAKINGS NOTIFIED TO THE MINISTRY OF AGRICULTURE DURING THE QUARTER ENDED DECEMBER 31ST, 1948

County	Undertakings Notified		Total Undertakings	Number of Cattle	
	During Quarter	Previously		Cows	Heifers
ENGLAND					
Bedford	—	5	5	84	32
Berks	3	27	30	912	615
Bucks	—	6	6	172	102
Cambridge	—	—	—	—	—
Cheshire	2	82	84	2,689	1,189
Cornwall	—	—	—	—	—
Cumberland	—	4	4	235	180
Derby	17	157	174	4,676	2,633
Devon	6	85	91	1,266	782
Dorset	—	3	3	78	49
Durham	5	115	120	3,058	1,363
Essex	11	79	90	3,385	2,524
Gloucester	2	19	21	643	666
Hampshire	4	91	95	3,170	2,525
Hereford	—	3	3	149	98
Hertford	—	23	23	763	552
Hunts	—	—	—	—	—
Isle of Ely	—	—	—	—	—
Isle of Wight	—	—	—	—	—
Kent	1	55	56	1,237	842
Lancs	4	58	62	2,036	842
Leics	6	51	57	1,488	1,200
Lincs (Holland)	—	—	—	—	—
Lincs (Kesteven)	—	8	8	84	81
Lincs (Lindsey)	—	7	7	109	113
Middlesex	—	1	1	12	5
Norfolk	2	22	24	837	635
Northants	—	19	19	361	458
Northumberland	1	26	27	815	698
Notts	5	83	88	2,043	983
Oxford	—	6	6	183	210
Rutland	—	—	—	—	—
Salop	6	54	60	7,817	1,186
Soke of Peterborough	—	—	—	—	—
Somerset	2	75	77	1,921	1,209
Staffs	5	78	83	2,534	1,624
Suffolk (East)	—	11	11	210	201
Suffolk (West)	1	15	16	425	336
Surrey	1	29	30	949	538
Sussex (East)	1	48	49	1,544	1,104
Sussex (West)	—	32	32	870	700
Warwick	1	42	43	1,392	716
Westmorland	—	3	3	49	21
Wilts	—	22	22	603	472
Worcester	3	63	66	1,205	734
Yorks (E.R.)	5	31	36	574	518
Yorks (N.R.)	—	47	47	919	599
Yorks (W.R.)	4	76	80	1,883	860
TOTAL, ENGLAND	98	1,661	1,759	53,541	30,285
WALES					
Anglesey	—	10	10	151	107
Brecon	—	3	3	73	50
Caernarvon	—	16	16	282	124
Cardigan	—	25	25	547	345
Carmarthen	2	115	117	2,248	1,199
Denbigh	—	11	11	228	138
Flint	—	21	21	547	217
Glamorgan	2	26	28	489	217
Merioneth	—	—	—	—	—
Monmouth	—	8	8	183	134
Montgomery	—	1	1	12	11
Pembroke	—	6	6	194	229
Radnor	—	1	1	5	1
TOTAL, WALES	4	243	247	4,959	2,772
TOTAL, ENGLAND AND WALES	102	1,904	2,006	58,491	33,057

Notes.—(1) Operative periods of undertakings: 1 year, 521; 2 years, 124; 3 years, 1,361. (2) Undertakings renewed for further periods: 1 year, 57; 2 years, 2; 3 years 19. (3) Undertakings not renewed at end of operative periods: 194. (4) The figures showing the number of undertakings notified during the month relate to entirely fresh undertakings and do no include undertakings renewed for further periods. Undertakings which have been cancelled or not renewed are not included in the figures for previous notifications.

County	Undertakings Notified		Total Undertakings in Force		
	During Quarter ending 31.12.48	Previously	Number	Number of Cattle	
				Cows	Heifers
SCOTLAND					
Aberdeen	3	12	15	729	453
Angus	—	5	5	172	90
Argyll	—	—	—	—	—
Ayr	—	8	8	300	189
Banff	—	—	—	—	—
Berwick	—	1	1	22	7
Bute	—	—	—	—	—
Caithness	—	—	—	—	—
Clackmannan	—	1	1	29	15
Dumfries	—	7	7	323	263
Dumbarton	—	1	1	12	10
East Lothian	—	1	1	20	8
Fife	—	17	17	676	468
Inverness	—	1	1	52	35
Kincardine	—	1	1	42	53
Kinross	—	3	3	59	41
Kirkcudbright	—	3	3	559	443
Lanark	—	2	2	100	78
Midlothian	—	—	—	—	—
Moray	—	—	—	—	—
Nairn	—	—	—	—	—
Orkney	—	—	—	—	—
Peebles	—	—	—	—	—
Perth	—	2	2	9	20
Renfrew	—	2	2	94	80
Ross-shire	—	3	3	172	72
Roxburgh	—	—	—	—	—
Selkirk	—	—	—	—	—
Stirling	—	6	6	182	181
Sutherland	—	—	—	—	—
West Lothian	—	1	1	17	29
Wigtown	—	12	12	1,000	517
Zetland	—	—	—	—	—
TOTAL	3	89	92	4,569	3,067

Notes.—(1) Duration of undertakings: 1 year, 22; 2 years, Nil; 3 years, 70. (2) Undertakings renewed for a further period (included in the second column of the statement): 1 year, 156; 2 years, 9; 3 years, 84. (3) Undertakings expired and not renewed (not included in the second column of the statement): 314. (4) The figures in the first column of the statement relate to entirely fresh undertakings.

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ADDRESSES OF DISEASE-INFECTED PREMISES

The list given below indicates, first, the county in which are situated the premises on which disease has been confirmed, followed by the postal address and date of outbreak.

SWINE FEVER:

Warwicks.—Avon Mill Allotments, Rugby, Warwickshire (Jan. 12th).

SHEEP SCAB:

Denbighs.—Tynant Gell, Llangerniew, Abergele, Denbighshire (Jan. 11th).

Flints.—Kinsale Hall Farm, Llanerchymor, Holywell, Flintshire (Jan. 11th).

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"THE AGENE PUZZLE"

Under the above heading *The Lancet* devotes the first editorial article of its issue of January 15th to this problem, in the following terms:

In December, 1946, Sir Edward Mellanby reported that hysteria in dogs could be produced by feeding them on flour treated with agene (nitrogen trichloride), the flour improver and bleacher in common use for the past 25 years in Britain, the U.S.A., and many other countries. Intensive investigations were at once begun by teams of workers here and in America to see whether flour so treated was harmful to other animal species, particularly man. It was soon found that somewhat similar symptoms could be produced in cats, rabbits, and ferrets, while American workers claimed that though monkeys did not develop hysteria they showed other abnormalities. In rats, guinea-pigs, and hens, on the other hand, there were no ill effects whatever. And despite exacting tests no definite evidence of harm has so far been observed in man, even when the flour has been treated with doses of agene considerably larger than in normal commercial practice. However, after a public hearing by the Food and Drug Administration in October, at which scientific, medical, and milling interests were represented, the U.S. Government has prohibited the use of agene after August 1st, 1949, and has immediately sanctioned the use of chlorine dioxide as an alternative flour improver. This decision, contained in the *Federal Register* for November 27th, 1948 (p.6969), has been reached despite the admission in the citation that "although the experimental work on humans is limited, no adverse effect as a result of foods prepared

from flours treated with nitrogen trichloride has been found." That being so, the Food and Drug Administration could not have banned agene under the Federal food laws, and the decision was presumably taken by the express wish of the trade interests.

Flour treated with chlorine dioxide does not produce hysteria in dogs or other animals; nor, so far as is known, does it have any harmful action on man. Nevertheless, chlorine dioxide is an even more powerful chemical reagent than nitrogen trichloride; and in food manufacture there has been far less experience with chlorine dioxide than with agene. We understand that our own milling industry has already developed plant for generating chlorine dioxide if the biological research now proceeding shows without doubt that the change from agene is desirable. Nearly 18 months ago we expressed this view: "At first blush it might be suggested that the use of agene as an improver in milling technique should be stopped, and it is true that there are possible substitutes. But a fuller investigation tends to discount any precipitate action . . . We think rather that the whole subject should remain in the field of investigation, with the double approach by medical research and by industry." Research is still in progress, and it is not yet clear on what evidence our American friends have decided to introduce a new improver whose potentialities appear uncertain. Admittedly experiments completely justifying their action may be announced to-morrow; but further research may support those who doubt the wisdom of their decision. Meanwhile, as reported in our Parliamentary columns on December 25th, a scientific committee including Sir Edward Mellanby and Sir Wilson Jameson is reviewing the situation on behalf of the Minister of Food.

In substituting chlorine dioxide for agene the Americans have recognised the need, under modern conditions, for flour improvers. The need is even greater in Britain, where much of the wheat milled is, perforce, not of the best bread-making quality, and where, as in the U.S.A. but not some other countries, the bulk of the bread is made not by hand but in machine bakeries. Clearly further research is called for in the quest for an improver which by its very nature would be above suspicion. Ascorbic acid could be used, but even if the necessary quantity could be made its cost would probably be prohibitive. An intensive enquiry with the aim of finding a satisfactory biological (as distinct from chemical) improver would be well worth while. Much of the research now being done on agene is directed towards the isolation of the product, formed by the interaction of the gas with protein, which is responsible for the toxic effect on dogs. The isolation of this product should help to explain the toxic substance's different action on dog and on man, and should also throw light on the mechanism of flour improvers in general.

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ENCOURAGEMENT OF HEAVY HORSE BREEDING IN SCOTLAND

To encourage heavy horse breeding, the Department of Agriculture for Scotland is prepared to offer financial assistance in 1949 to heavy horse breeding societies in Scotland. Assistance will be in the form of direct and premium grants. Direct grants of up to £40 per stallion are offered to societies which hire approved animals, the maximum being payable if 40 or more mares are served by the stallion during the season. This will be paid in two equal instalments, the first upon receipt of the service book, at the end of the season, and the second upon receipt of the foaling results in 1950. Premium grants may be awarded up to a maximum of £40 in order to assist "small farmer" members to have mares served at a reduced fee.

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UNIVERSITY OF BRISTOL VETERINARY FIELD STATION

Langford Place, a fine Regency house with eight acres of land, has been bought by the University of Bristol to accommodate the teaching staff of the field station of the new School of Veterinary Science at Langford House, three-quarters of a mile away.

A start has already been made in the long process of building up stock at the country station, but veterinary students will not go there until their third year. Students who have completed the preliminary training elsewhere may be taken earlier.

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SCOTTISH LICENSING OF BULLS AND BOARS

The number and breeds of bulls licensed and rejected during 1948 under the Act in Scotland are shown in the appended table which gives the corresponding details in 1947 for comparison. It will be observed (says *Farming News*) that the number of licences rose from 7,140 to 8,585 (22 per cent. increase) and the number of rejections from 302 to 396.

Aberdeen-Angus and Ayrshires, at the top alphabetically, are the most numerous holders of licences. Though 300 extra A.A. licences were issued, the rejected number is smaller. The Ayrshire licences have risen by over 1,000 and the rejects are twice as numerous as in 1947.

	1948		1947	
	Lic.	Rej.	Lic.	Rej.
Aberdeen-Angus	1,334	64	1,032	90
Ayrshire	5,713	236	4,682	114
Friesian	389	21	356	20
Galloway	193	26	151	15
Guernsey	11	—	3	2
Hereford	11	—	4	—
Highland	69	8	59	6
Jersey	28	3	19	3
Kerry	2	—	—	—
Lincoln Red	—	—	1	—
Red Poll	17	1	10	1
Shetland	9	1	12	2
Shorthorn (Beef)	751	39	766	45
Shorthorn (Dairy)	57	3	45	4
Welsh Black	1	—	—	—
Totals	8,585	396	7,140	302

Similar figures are issued for boar licensing, which became effective in 1944. During the past year 983 boars were licensed compared with 598 in the previous year, an increase of 64 per cent. Rejects numbered 199 against 58 in 1947.

	1948		1947	
	Lic.	Rej.	Lic.	Rej.
Large White	797	150	501	45
Large Black	83	14	27	3
Essex	7	3	5	—
Wessex	80	32	51	9
Tamworth	12	—	14	1
Other breeds	4	—	—	—
Totals	983	199	598	58

The most notable increases, it will be seen, occur in the Large White, Large Black, and Wessex.

CORRESPONDENCE

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the N.V.M.A.

Correspondents are requested to write as briefly as possible

MEAT HYGIENE

Sir,—In your correspondence columns of January 15th, Mr. D. J. Anthony takes us to task for our suggestion that a smaller type of central abattoir based on the "German type" might be more appropriate for this country than the "factory type."

Mr. Anthony's main contention seems to be that the "German type" of abattoir does not utilise effectively all the by-products and that only the "factory type" can deal with these effectively and avoid waste. We can assure Mr. Anthony from intimate personal knowledge gained from a considerable time spent by one of us in studying the system in Germany prior to 1939 that this is not so and that the German type of abattoir did with few exceptions endeavour to utilise every by-product. It is true that the system commonly followed in this country has not, so far, been as successful as the German, but we must point out that in order to avoid misunderstanding, we qualified our recommendation with the phrase "providing all essential facilities" which would appear to meet most of Mr. Anthony's criticism.

Yours faithfully,

A. Ginsberg,
A. Robertson.

Department of Hygiene and Preventive Medicine,
Royal (Dick) Veterinary College.

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SUSPECTED SALT POISONING IN PIGS

Sir,—I was very interested in the clinical communication on "Suspected Salt Poisoning in Pigs," by W. H. Parker and P. H. Brooksbank in *The Veterinary Record* (No. 1, Vol. **61**) dated January 1st, 1949. Our experience at this laboratory is very similar to that of Parker and Brooksbank. The following cases are typical:—

Case No. 1.—Two in-pig sows died after showing evidence of what the owner described as "fits." *Post-mortem* examination showed a very slight inflammation of the small intestine. The contents of the large intestine were very dry and adherent to the dehydrated mucous membrane. Bacteriological examination was completely negative. The sows had been fed swill collected from a local cannery. This swill at the time that the sows fell ill, contained a very large proportion if carrots which had evidently been prepared for canning. Analysis of the stomach contents of one of the sows showed 7.1 per cent. chloride as NaCl. (expressed on a dry matter basis). The carrots themselves yielded 27 per cent. chloride as NaCl. Fortunately none of the swill containing carrots had been fed to the other pigs on the premises which remained healthy and no further losses occurred after the offending swill had been withdrawn from the food.

Case No. 2.—In this outbreak four pigs dicd out of a litter of seven. They were four months old. The symptoms noted by the owner were excessive thirst and "fits." There was no evidence of gastritis or enteritis in any of the specimens examined but the contents of the large intestine were abnormally dry. Bacteriological examination was negative. Analysis of stomach contents showed 4 per cent. chloride as NaCl. It was ascertained that these pigs had been fed swill containing cauliflower from a pickle factory. Again no further trouble was seen when the offending swill was omitted from the diet.

Case No. 3—Here a whole litter of nine pigs died after showing typical symptoms. Analysis of stomach contents showed over 9 per cent. chlorides as NaCl. The owner had mixed the pig ration in a large tarpaulin in the barn the previous day. The litter which died had received the sweepings of the tarpaulin for the evening meal. A sample of this yielded over 23 per cent. salt.

We have had several other suspected cases of salt poisoning where the stomach contents contained from 3 per cent to over 7 per cent. of salt, but where the source of the salt could not be determined. In all these cases the symptoms were very similar to those described by Parker and Brooksbank. There is no doubt that a disease syndrome in pigs is seen in the field associated with a high salt content in the diet but the exact part played by the salt is still obscure in view of the difficulty experienced in reproducing the condition experimentally.

Some of our cases have been associated with faulty mixing of the salt in compound rations. We have known this to be responsible for heavy losses in poultry as well. In such cases "pockets" of meal containing a high proportion of salt may occur, often only in a few bags in a large mix.

Yours faithfully,

Veterinary Research Division, D. Luke.
The Farm,
Stormont,
Belfast.
January 10th, 1949.

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THE INCIDENCE OF TUBERCULOSIS IN THE HORSE

Sir,—With reference to the letter by Mr. H. E. Bywater which appeared in *The Veterinary Record* of January 1st, 1949, I have to record that in the course of meat inspection duties in two licensed horse abattoirs in Stirlingshire, no case of tuberculosis has been encountered since the inauguration of the two premises in October, 1946.

One suspected case was examined about five weeks ago, when a cervical vertebra was involved in a disease process which, on laboratory examination, failed to yield acid- and alcohol-fast bacilli.

This experience is based on 4,724 horses killed and examined during the year 1947 and on 6,820 horses killed and examined from January 1st, 1948, until November 30th, 1948.

Yours faithfully,

"Bencleuch," W. Grant.
Newmarket,
Bannockburn.
January 11th, 1949.

. . . . .

Sir,—In view of recent letters on the above subject it may be of interest to readers to hear of a case of tuberculosis in a pony which was subjected to the intradermal test. A six-year-old Exmoor pony showed first lameness in the off hind pastern joint, then some days later stiffness in the neck, and was tested. Readings were Avian 4 mm.-4 mm.; Mammalian 4 mm.-24 mm., with marked diffuse oedema and pain. *Post-mortem* examination showed lesions on the peritoneum, in the spleen substance, mesenteric glands, surface of pleura; millet seed lesions in the lungs and a very marked tuberculous pericarditis. The pony had been in the hands of the owner for three years; no previous history was available. It had, however, been running in a field with cows, one of which was said to have gone down and had either died or been destroyed just after calving and found to be an advanced case of tuberculosis. In view of the rapid course in the pony I feel it was probably a case of infection from the cow.

Yours faithfully,

1, London Road, John B. Edwards.
Wellingborough.
January, 15th, 1949.

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CONDITIONS OF EMPLOYMENT OF YOUNG GRADUATES

Sir,—In view of recent correspondence appearing in the *Record* on the subject of assistants' conditions of employment, the Association of Veterinary Students feels that it should clarify its position.

As the letter written by Mr. Cole-Powney (*Vet. Rec.*, December 18th) may be read as expressing the opinion of this Association, we wish to point out that Mr. Cole-Powney's letter is purely a personal communication.

In view of the fact that discussions are still in progress between the N.V.M.A. and the A.V.S. we feel that at this stage, while we appreciate what has been done in the matter, we can do no more than express our strong approval of the protest made by Mr. Blamire (*Vet. Rec.*, December 11th).

Yours faithfully,

Association of Veterinary Students, G. Leam,
School of Veterinary Science, *Hon. Secretary, A.V.S.*
Bedford Street North,
Liverpool, 7.
January 12th, 1949.

DISEASES OF ANIMALS ACTS, 1894 TO 1937, AND AGRICULTURE ACT, 1937 (PART IV).

Summary of Returns of Confirmed Outbreaks of Scheduled (Notifiable) Diseases

Period	Anthrax	Foot-and-mouth	Fowl Pest	Parasitic Mange*	Sheep Scab	Swine Fever
Dec. 16th to 31st, 1948	8	3	8	—	5	—
Corresponding period in—						
1947	6	1	48	—	17	3
1946	4	13	—	—	2	2
1945	4	2	—	—	3	22
Jan. 1st to Dec. 31, 1948	118	15	267	1	69	27
Corresponding period in—						
1947	121	104	2,222	1	103	37
1946	95	54	—	7	94	347
1945	119	129	—	6	121	928

Note.—The figures for the current year are approximate only.
* Excluding outbreaks in Army Horses.

Tuberculosis (Attested Herds) Schemes

The number of Attested Herds, *i.e.*, herds officially certified as free from Tuberculosis as at December 31st, 1948, was as follows:—

England	Wales	Scotland	Total (Great Britain)
12,972	12,276	11,143	36,391

Advertiser's Announcement

Burroughs Wellcome & Co. announce that from January 6th, 1949, the price of their Balling Gun for the administration of 'Tablold' brand Phenothiazine is 16s. 6d. net.